

### **REMARKS**

Claims 1 – 15 and 17 – 19 are pending for examination. Claims 1,3,6,8,11 and 19 have been amended and claim 20 has been added. Favorable reconsideration and allowance of this application is respectfully requested in light of the amendment and the foregoing remarks. No new matter has been added.

### **Interview Summary**

Applicants discussed with the Examiner on April 16, the previous rejection, particularly regarding the Armstrong and Colston references. While no agreement was reached regarding the disclosure of the Armstrong reference regarding the placement of the vane motor, it was determined the rejection was improper as neither reference showed the use of a hydraulic pump with a variable flow rate and reversal of the direction of delivery, the pump in fluid flow communication with the at least one swiveling motor. The Examiner has agreed to remove the finality of the action.

### **Rejection of Claims under 35 U.S.C. §112**

Claim 1 was rejected under 35 USC 112, second paragraph, as indefinite for failing to point out and distinctly claim the subject matter. The language of claim 1 has been clarified that the vane is movable with respect to the component to which the fixed vane is affixed. Removal of this rejection is requested.

**Rejection of Claims under 35 U.S.C. §103**

Claims 1, 2, 4, 5, and 19 were rejected under the provisions of 35 U.S.C. §103 as obvious by Armstrong (U.S. 3,939,933) in view of Colston (U.S. 3,904,042).

Applicant's amended Claim 1 recites a hydraulic steering device for centre pivot steered vehicles with a centre pivot joint between major first and second ground-engaging components of the vehicles. The device includes at least one hydraulic swiveling vane motor for producing the steering. The swiveling vane motor is in the form of a centre pivot steering joint of the centre point-steered vehicle or is arranged in the rotary axis of the centre point steering joint of the vehicle. The swivel vane motor comprises at least one one moveable vane commonly arranged on the rotary axis of the centre pivot joint wherein a portion of the pump the fixed vane is fixed in relation to the first ground-engaging component, the moveable vane is fixed in relation to the second ground-engaging component, and movement of the movable vane relative to the fixed vane causes pivotal motion about the rotary axis which results in vehicle steering movement. The vane motor is powered by a hydraulic pump with a variable flow rate and reversal of the direction of delivery, the pump in fluid flow communication with the at least one swiveling motor. A pump with a variable volume flow with reversal of the direction of flow may avoid pressure losses at the throttle edges in valves, as they can be omitted from the performance circle. In addition, a variable pump possesses rapid

response behavior and a precise regulation of the volume flow, which is beneficial to steering devices

Armstrong shows a transmission control system powering both the tractive drive of the vehicle and auxiliary services. The system has a torque converter used for adjusting the system to reduce the power transmission for the engine to the tractive drive of the vehicle in response to the amount of hydraulic pressure acting on an auxiliary hydraulic device of the vehicle. Examples of this device are given as a hydraulic motor in the form of A.) a ram, B.) vane motor or C) a hydraulic steering device or the like in which case the power transmission from engine to traction drive is reduced optionally to zero. No suggestion is made that the vane motor is used for steering of the vehicle or as to the location of the motor. The recited sentence appears to point away from the use of the vane motor for steering of the vehicle, particularly at the point recited based on that the hydraulic motor lists powering a vane motor and powering a hydraulic steering device as two different alternatives. It is likely that the application may have been referring to an alternative use of a Hydraulic vane motors. (ie. circulating hydraulic fluid to a valve bank controlling lift and tilt cylinders.) The only indication of a steering device of the articulated vehicle are two steering rams, which are known in the art. Several other rams 36,38 are shown in the application. Specifically, Armstrong does not recite Applicant's positioning of the swiveling vane motor in the form of a centre pivot steering joint of the centre point-steered vehicle or is arranged in the rotary axis of the centre point steering joint of the vehicle. Armstrong further does

not show the alignment of the rotary axis of the swiveling vane motor on the centre pivot axis and the attachment of the vanes such that rotary movement of the swivel vane motor directly results in pivotal motion of the first and second ground-engaging portions of the vehicle about the centre pivot axis. Additionally, as noted above Armstrong does not discuss the use of a hydraulic pump with a variable flow rate and reversal of the direction of delivery in fluid flow communication with the at least one swiveling motor. Armstrong appears to only show

Colston shows a robotic arm style manipulator apparatus, having parts interconnected by power operated pivots and rotary joints. The vain pump is operated to manipulate the positioning of the robotic arm. The vane motor is controlled by the valves between the pump and a pressure source. It would not be obvious to combine this reference with Armstrong to show the use of a vane motor between ground engaging elements along the center pivot axis of a construction vehicle for steering purposes. The applications, and particularly the forces and scale related to the components involved are so dissimilar that the two fields of manipulating a robot arm and steering a vehicle are not commonly cross references.

As neither reference alone or in combination shows or suggests all of the elements of Applicant's Claim 1, Armstrong in view of Colston are inadequate obviousness references. Withdrawal of the rejection is respectfully requested. Claims 2, 4, 5, and 19 depend, either directly or indirectly from Claim 1 and should be allowable for at least the same reasons.

Claims 4 – 5 are separately patentable as they incorporate additional swivel vane motors arranged above or below the centre pivot joint along the rotary axis opposite of the first swivel vane motor. This configuration increases the available steering torque or allows reduction in the size of each of the individual swiveling motors. As the maximum steering torque results from the total volumes of all the motors working together, thus an optimum ratio of size to the possible steering torque is achieved. Armstrong and Colston do not show any vane motor configuration using multiple motors, particularly arranged along the rotary axis of the vehicle in the manner discussed.

Claim 19 is further patentable as the swiveling motor is positioned in the joint (integral to the joint), an example of which is shown in Figure 4, such that a connecting section of a first ground engaging portion of a vehicle runs through the swiveling motor and bearing points of the swiveling motor forming a turning bearing between the first and second ground engaging components of the vehicle. Neither Armstrong nor Colston show the swiveling motor forming the joint of a centre-pivot steered vehicle as recited. Armstrong as previously discussed does not positively recite the positioning of the vane motor. Colston also does not appear to show this arrangement.

Claims 3, 6 – 11 were rejected under 35 U.S.C. §103(a) as being unpatentable over Armstrong in view of Colston and Sprinkle et al. (US PG/PUB 2003/0013575).

Claims 3 and 6 – 11 depend, either directly or indirectly, from Claim 1 and should be allowable for at least the same reasons cited above.

Claims 3,9 and 10 are separately patentable as none of the references show using a sensor and controller to adjust the vane motor for steering purposes. Sprinkle discloses a variable displacement pump used in a hydrostatic transmission that is used for powering the vehicle in a forward or reverse direction and controlled by a microprocessor connected to a sensor, but fails to disclose Applicant's swivel vane motor in which the rotor and stator act directly on the forward and rearward portions, respectively, of a centre-pivot steered vehicle for rotating a first ground engaging portion of an articulated vehicle with respect to a second ground engaging articulated vehicle. Additionally the sensor 46, indicated by the examiner, is used to detect the vehicle ground speed by determining the speed of the transmission gear. The speed is then compared by the controller to the commanded speed detected by the pedal position sensor and attempts to correct signal from the micro controller to the control vales to reduce or increase the hydrostatic transmission speed output. Sprinkle does not use the sensor to control the steering of the vehicle, or more particularly the speed of the pump. Absent further teaching in the art, the use of pump in a drive/propulsion application on a vehicle based on feedback received from a controller does not make it obvious to use to the same pump to drive a steering motor on a different vehicle.

Claim 6 is separately patentable as Armstrong Colston and Sprinkle et al. do not show the at least one swiveling motor having at least a first and second chamber in fluid connection with a first and second outlet of the pump and is arranged-directly connected to the pump such that running the pump in a first direction delivers a pressure to the first

chamber steering the vehicle in a first direction and running the pump in a second direction delivers a pressure to a second chamber for steering a vehicle in a second direction. None of the references appear to show a reversible pump controlling a vane motor in the manner claim, which can alleviate the necessity of some additional and expensive control valves.

Claim 8 is further patentable as none of the references, as previously discussed, show a controller configured to receive a steering signal from the operator, wherein the controller is configured to convert the signal to a corresponding displacement volume and either the first or second direction of flow of the pump, and transmit a signal to adjust the swash plate of the pump to achieve the determined displacement volume and direction.

Claims 12 – 15 were rejected under 35 U.S.C. §103(a) as being unpatentable over Armstrong in view of Colston and Sprinkle as applied to Claim 7, and further in view of Sakamoto (US 5,584,346).

Claims 12 – 15 depend directly from Claim 7 and indirectly from Claim 1; they should be allowable for at least the same reasons discussed above.

Claims 12-15 are further patentable as, as the references, particularly, Sakamoto do not show any use of force feedback that transmits forces felt in actual operations relating to the steering of the vehicle. Sakamoto discusses a man-machine interface (joystick) for a controller on a grader, but fails to disclose Applicant's claimed swivel vane motor in which the rotor and stator act directly on the forward and rearward

portions, respectively, of a centre-pivot steered vehicle. Further, Sakamoto only shows a joystick with a return to neutral function for setting a target blade tilt angle.

Claims 17 and 18 were rejected under the provisions of 35 U.S.C. §103(a) as being unpatentable over Armstrong in view of Colston and Sprinkle as applied to Claim and 11, and further in view of Sakaki (US PG/PUB 2002/0170769).

Claims 17 and 18 indirectly depend from Claim 1 and should be allowable for at least the same reasons discussed above.

#### New Claim 20

New claim 20 has been added which recites the hydraulic circuit permitting the pump to drive the motor and is supported by example, at least, in Figs. 7 and 8. None of the prior art appears to show a similarly arranged hydraulic arrangement of a first and second circuit that permits the achievement of multiple driving characteristics using a vane motor steered vehicle.

#### Conclusion

It is submitted that claims 1-15 and 17-20 define patentable subject matter. A Notice of Allowance is therefore respectfully requested.

No fee is believed due with this communication. Nevertheless, should the Examiner consider any fees to be payable in conjunction with this or any future communication, authorization is given to direct payment of such fees, or credit any overpayment to Deposit Account No. 14-0780. The Examiner is invited to contact the undersigned by telephone if it would help expedite matters.



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Respectfully submitted,

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